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AUTHOR Chen, J. Q.; And Others
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ABSTRACT

This study examined whether evidence for understanding the distinction between natural and man-made aspects of the world can be found in young children. Children 3, 5, and 7 years of age were asked to make judgments about the origins of 12 objects and people's ability to change the objects. The objects were evenly divided into naturally occurring objects such as clouds and mountains, and man-made objects such as helicopters and spoons. Results suggested that the youngest children were unable to answer the origins questions correctly, while members of both older groups were able to do so. More children in all three age groups correctly indicated the origins of man-made objects more frequently than of naturally occurring ones. When asked whether people could change the objects pictured in the photographs, the youngest answered that they could not, while the older children answered that they could. Crafted objects were seen as more amenable to change than natural ones. For positive responses to the change question, age differences were found in kinds of suggested alterations consistent with earlier observations about children's conceptual development from perceptual to functional changes. Children in all age groups correctly categorized unfamiliar objects despite their inability to identify them correctly. It is concluded that by the age of 7 years, children seem able to differentiate between natural and man-made objects. (RH)

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Children's Understanding of the Distinction Between Natural and Crafted Objects

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J.Q. Chen, L.T. Goldsmith, & D.H. Feldman

Tufts University

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Children's developing ability to distinguish animate from inanimate objects or alive/not alive categories have been studied extensively (Carey, 1985; Gelman, 1987; Keil, 1979; Piaget, 1976). Another categorical distinction, but one not often articulated, is that of naturally occurring versus man-made objects. This categorization may have theoretical importance: distinguishing between the natural and the "crafted" world may be the first step in recognizing that people can change the environment in significant ways (Feldman, 1989).

Feldman has recently argued that in order to fully understand the development of human thought, an additional "cultural genetic epistemology" is needed in contrast to the Piaget's genetic epistemology. Traditional Piagetian epistemology focuses on how individuals develop increasingly mature structures for understanding the natural world: it assumes that the objective world which people seek to know is a stable and unchanging one, and it considers the endpoint of cognitive development to be a flexible and powerful structuring of the laws and logic of the physical world. The traditional constructivist view of cognitive development is that children, through experiences with the world, accommodate their cognitive

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structures toward increasingly true representations of an immutable world: for example, the logic of space, time, or causality.

In contrast, a cultural epistemology emphasizes the processes of understanding those aspects of the world which are subject to human intervention and alteration (Feldman, 1988a, 1988b, in press). These aspects include consideration of cognitive development in non-universal domains, which have been created, developed, advanced and altered in human societies. Nonuniversal domains of thought do not preserve irreversible universal truths, but rather reflect the current collective human understanding about a particular discipline or field of knowledge. As knowledge proceeds, the domain itself will accommodate to these changes. Therefore, the cultural epistemological view includes a provision for the world to accommodate to new information, and not just the epistemic subject. This, in turn, alters the notion of how change affects the mind, for it leaves open the possibility that people may produce changes which not only yield deeper individual understanding of the existing world, but which also change the world as we currently know it through new discoveries or inventions (Feldman, 1980; Horowitz, 1987; Vygotsky, 1978).

One key source of evidence for the mutability of the cultural world comes from the awareness of existing man-made alterations to the world. Yet we do not know whether this distinction is developed by children without explicit guidance or certain kinds of experiences in the world. The present study

examines whether evidence for the distinction between natural and man-made aspects of the world can be found in young children.

This distinction was examined in children by asking three, five, and seven year olds to make judgments about the origins of 12 objects and about people's ability to change them. The 12 objects were evenly divided into naturally occurring (e.g., clouds, mountains, exotic bird, ginger root) and man-made categories (e.g. helicopter, pincushion, jade sculpture, spoon), with objects in both categories pre-defined as either familiar or unfamiliar.

General results suggested that the youngest children (age 3) were unable to answer the "origins" questions correctly (only 15% of the 3 year olds answered correctly for natural objects and 25% for crafted ones), while both of the older groups were able to do so. More children in all three age groups correctly indicated the origins of man-made objects than naturally occurring ones, although this difference was not statistically significant (Table 1).

When asked whether people could change the objects pictured in the photographs, the 3 year olds as a group answered that they could not, while the 5 and 7 year olds answered in the affirmative. Overall, crafted objects were seen as more amenable to change than natural ones. When children said that objects could not be changed, the most frequent justification offered was that the objects themselves did not afford alteration (i.e., clouds couldn't be changed because you couldn't really touch them; mountains were too difficult to change because they were so hard). The two younger groups (3 and 5 year olds) also responded

that people were not strong or powerful enough to effect a change, again most often with reference to the naturally occurring objects ("you'd have to be Superman to change a mountain!") With respect to the crafted objects, the most frequent justification for "no change" for the 3 and 5 year olds was that there would be no need to do so, because the object was fine as it was.

For positive responses to the "change" question, age differences were found in the kinds of alterations suggested. Nonsensical answers were made most often by three year olds, the youngest subjects. Five year olds most frequently mentioned changing the perceptual attributes of the objects, while 7 year olds proposed functional alternations (Figure 1). These responses are consistent with earlier observations regarding children's conceptual development trend from perceptual to functional changes (Flavell, 1977).

In terms of the functional changes themselves, children's proposed alterations were of three general types: (1) dismantling and rebuilding of objects; (2) altering the use of the object with some attendant physical change; and (3) effecting biological or physical changes of naturally occurring objects. These responses suggest that even young children show a tendency to dismantle products, re-work the materials, and try to create something new.

The results of this study indicate that by the age of 7 young children seem able to make a distinction between natural and man-made objects. The youngest children in this study did not demonstrate strong evidence for this distinction: we would

caution, however, against drawing firm conclusions regarding 3 year olds' ability to make this distinction or to recognize the mutability of man-made objects on the basis of this one study. The present task relied heavily on articulated verbal responses and could be considered in some sense to have assessed "meta-" rather than working knowledge of these conceptual categories. Other tasks which are more sensitive to the constraints on preschoolers' attention and response capabilities might indicate more articulated knowledge of the natural/crafted distinction. One piece of evidence from the current study supporting this is the observation that children in all three age groups correctly categorized unfamiliar objects despite their inability to identify them correctly. This is consistent with Gelman's (1987) observation that concept development in young children involves the construction of guiding principles which organize subsequent information and experience.

It appears, then, that the distinction between objects existing in nature and those created and changed by man is one which begins to be articulated in young children and is operational before children enter school. Young children recognize that there are parts of the world that are made by people, that they can be altered, and even that they can be reworked and transformed. An appreciation of this distinction seems fundamental to any individual's directed efforts to push at the existing limits of knowledge and practice in nonuniversal developmental domains.

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Table 1.

% of Children's Responses for Origins of Natural Objects

	Age (a)		
	3	5	7
Correct	17	58	75
Incorrect	83	42	25

(a)n = 12 for each age group

% of Children's Responses for Origins of Crafted Objects

	Age		
	3	5	7
Correct	25	83	100
Incorrect	75	17	0

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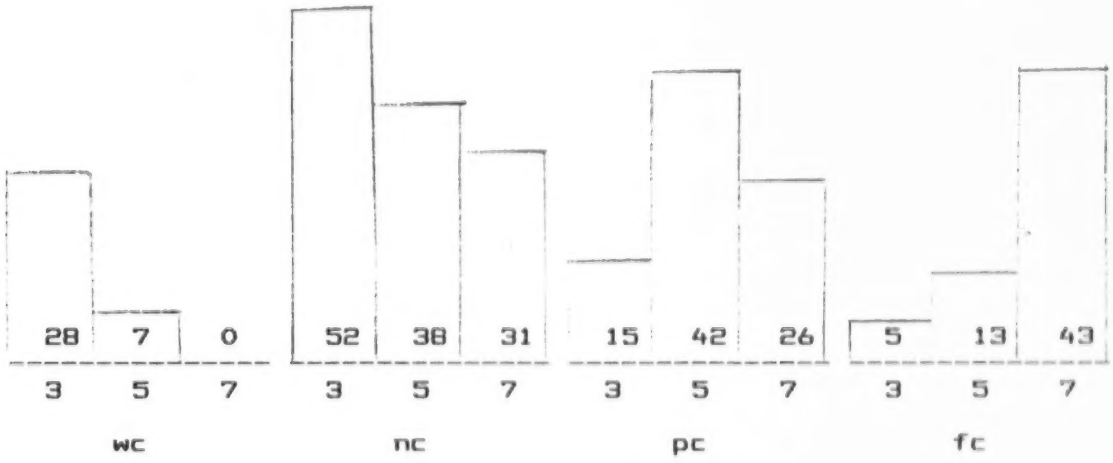
Figure 1

% of Alterations Suggested for Kinds of Objects Changes



WC: (Wrong Changes) The child offered some change possibility for an object, but the alteration offered was meaningless or nonsensical and it did not yield interpretable information about the child's understanding of object changes (e.g., change a rocket into a jacket).

NC: (No Changes) The child did not believe any possibility for human beings to change an object.

PC: (Perceptual Changes) The child referred to alterations of an object's color, form, position, or size.

FC: (Functional Changes) The child suggested alterations of using an object, change of biological or physical nature, or re-creation of the original materials.